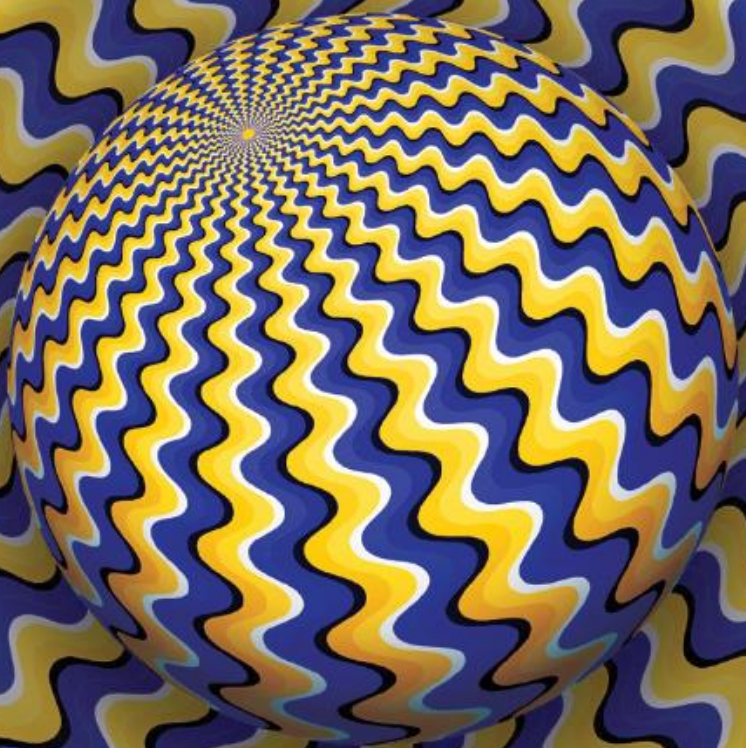
EYE-MAZING ILLUSIONS

MOTION COMMOTION!

OPTICAL ILLUSIONS



by Spencer Brinker

CREATE!

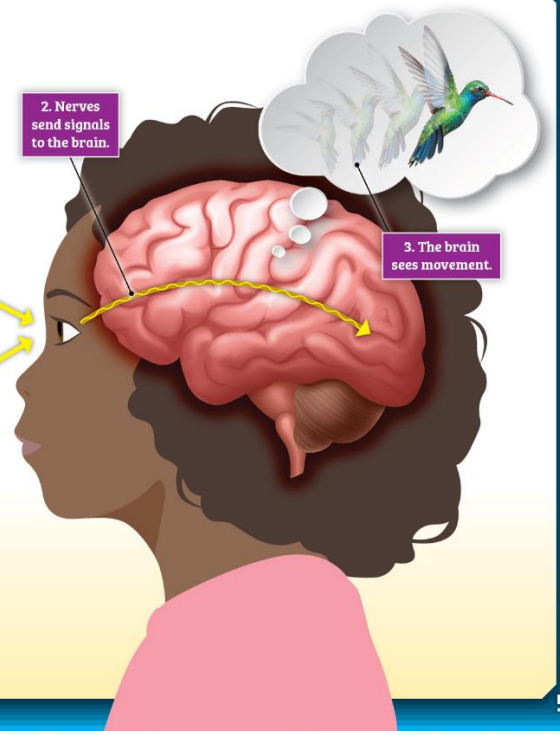
Eyes, Brain, Action!

You see movement all around you, from birds flying in the sky to a video playing on a screen. But how do you actually see these things?

To see motion, your eyes and brain work together. First, light bounces off moving objects or comes from a source such as a video screen. This light comes to your eyes. From there, **nerves** send signals to the brain. The brain uses this information along with past experiences to **interpret** motion.

Images on electronic screens appear to move when tiny colored dots or squares called **pixels** change **hue** and brightness.

1. Light from objects travels to the eyes.

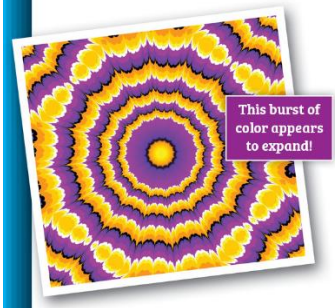


2. Nerves send signals to the brain.

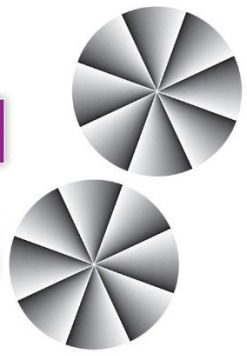
3. The brain sees movement.

It's Moving . . . Isn't It?

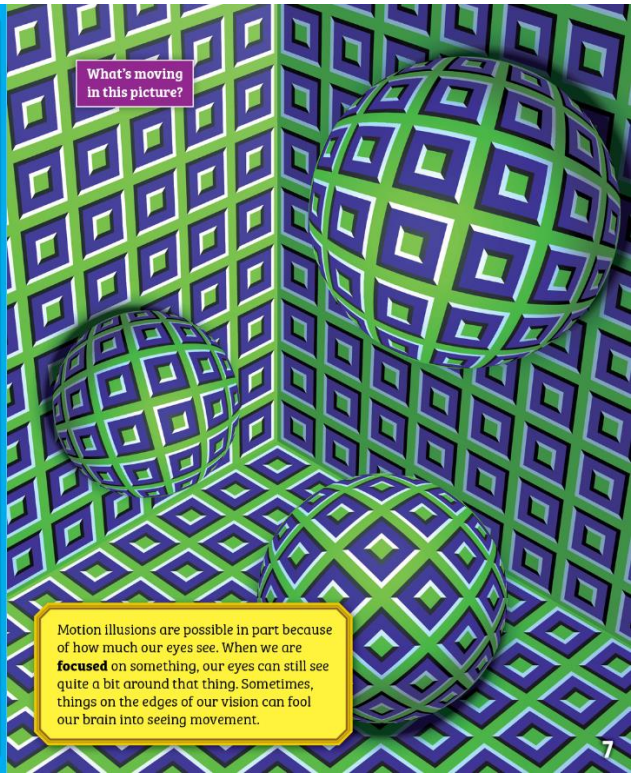
Sometimes, images can appear to move even when they aren't. These are **optical** illusions—images that tricks the brain into seeing things differently than they are. The pictures in this book aren't moving. But your brain may think they are! Let's check out some optical illusions!



This burst of color appears to expand!



Look at the side of these two circles. Do they appear to rotate in opposite directions? What happens when you blink?



What's moving in this picture?

Motion illusions are possible in part because of how much our eyes see. When we are **focused** on something, our eyes can still see quite a bit around that thing. Sometimes, things on the edges of our vision can fool our brain into seeing movement.

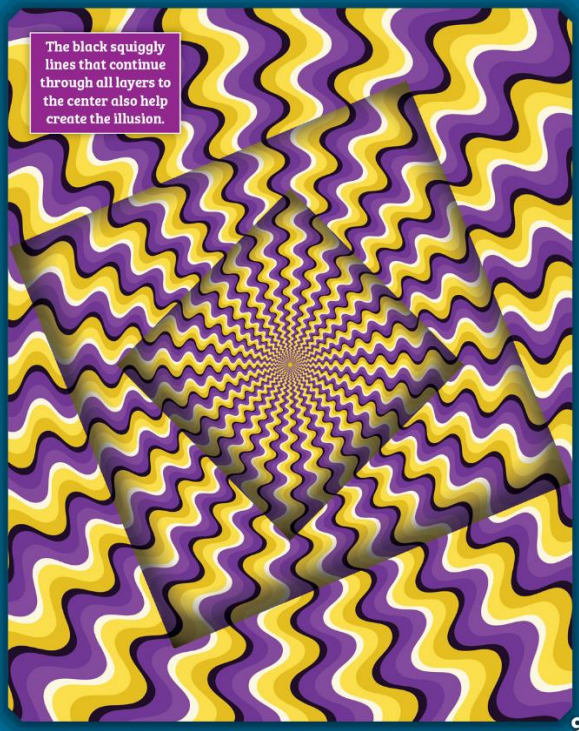
Squiggles in Squares

This illusion looks like layers of wavy lines with squares cut out. As your eyes move around, the wavy lines appear to move. What's going on?

Shadows around the squares make the picture appear to have layers. They give an illusion of **depth**. That, along with the switching pattern of lighter and darker squiggly lines on each layer, makes your brain think the squiggles are moving.

You may have seen squiggles appear above a hot surface, such as a road. This is called a mirage—a kind of optical illusion where light is bent in the hot air.

A mirage caused by heat can sometimes look like water on a road.



The black squiggly lines that continue through all layers to the center also help create the illusion.

Making Waves

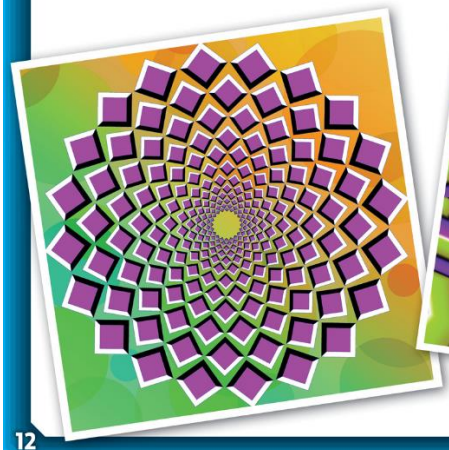
What's happening here? The dots seem to move in waves like ripples on water. But as soon as you focus on just one dot, the moving stops. Why?

These dots have thick black-and-white edges. The position of the black and white changes from dot to dot. The brain sees this change as movement across the pattern.

If the surface of a mirror is curved, it can make a person look wavy, too!

Flower Power

Combining certain colors, shapes, and patterns can also trick the mind into seeing movement. When white and black are added to the edges of the patterns, the illusion of motion is even stronger. These flowerlike images seem to swirl, twirl, or grow larger right before your eyes!



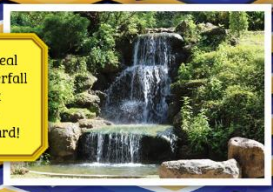
An orchid mantis uses motion to trick its **prey** into thinking it's a flower. It **sways** back and forth as if it's a flower moving in a breeze!

Floating Up

These **spheres** appear to be floating upward, while the background appears to **drift** downward. The pattern of light and dark colored lines is reversed from the spheres to the background. This change, along with the angles of the lines, fool the brain into seeing motion.

The background is an important part of what makes this illusion work. Check out the spheres partially off the background. They should stay still!

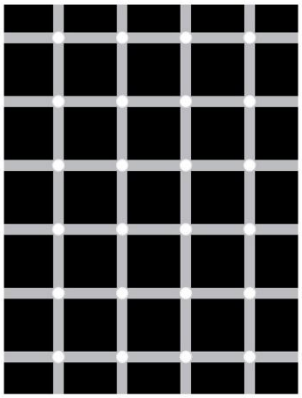
Want to see an illusion in the real world? Stare at a moving waterfall for about a minute. Then, shift your eyes to nearby trees. The trees will appear to float upward!



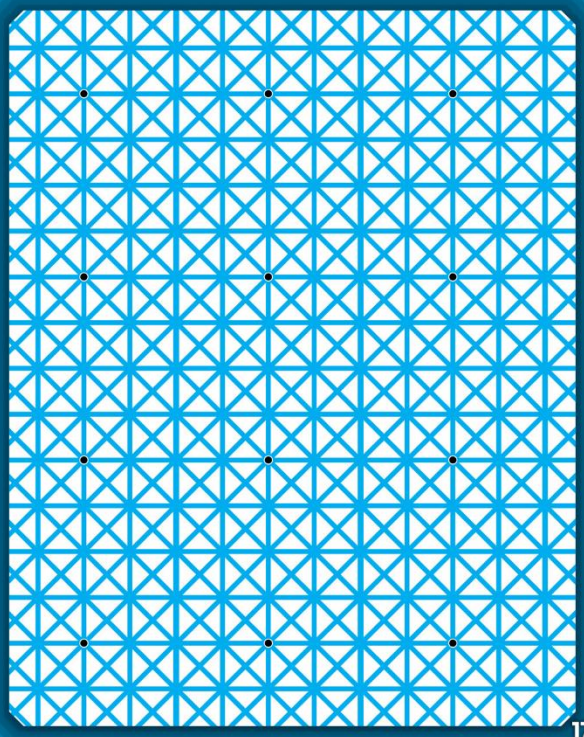
Dots or Not?

Look at the large blue grid pattern. Find the black dots within the grid. When you focus on just one dot, what happens to the others? They seem to disappear! The grid fools the brain into thinking the other dots aren't there. Then, they reappear when your eyes move toward them again.

Grid illusions use light and dark areas with intersecting lines to make the brain see—or not see—dots.

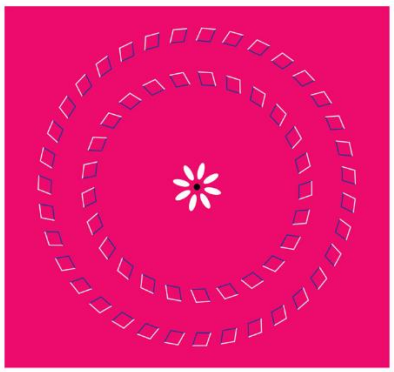


Look at the white dots on this grid. As your eyes move around, darker dots seem to appear and disappear in other parts of the grid.

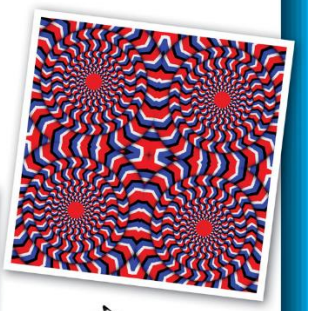


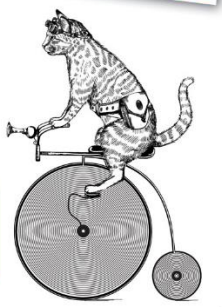
Spinning Circles

Some illusions use patterns to create the appearance of circles spinning. When you see these patterns on the edges of your vision, they make you think there is movement. Look at the pink square below. Stare at the dot in the center. Now, slowly move your head closer and then farther away. The circles seem to rotate in opposite directions!



The illusion of spinning is created when certain patterns are arranged in circle shapes.

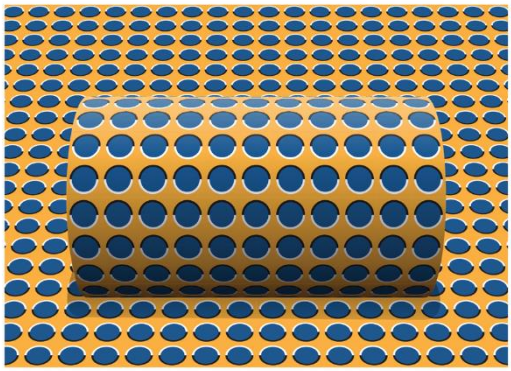


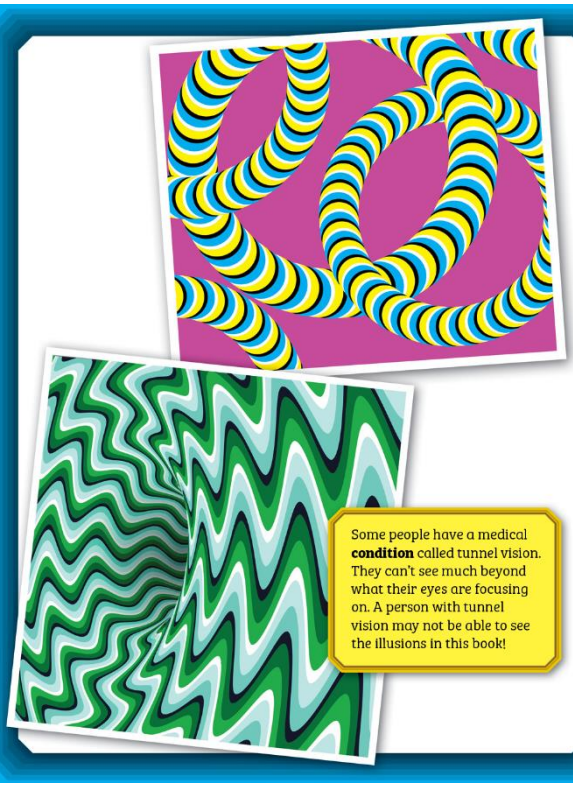


The wheels of this cat's bike are made up of many circles. Slowly turn the book, and the wheels seem to be spinning.

Tubes and Tunnels

Motion illusions can also look like turning tubes and twisting tunnels. Here, patterns and shading create the illusion of movement. A colorful tube seems to be moving as your eyes pass over it. Wavy lines that appear to go into a tunnel trick the brain into thinking the sides are slowing moving.





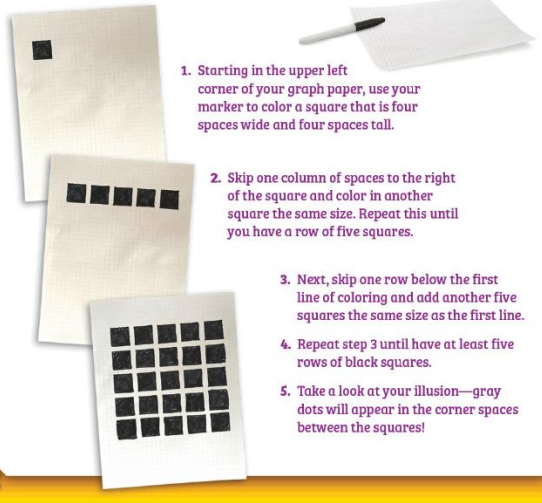
Some people have a medical **condition** called tunnel vision. They can't see much beyond what their eyes are focusing on. A person with tunnel vision may not be able to see the illusions in this book!

— MAKE YOUR OWN —

Grid Dot Illusion

Now try making your own grid optical illusion. Amaze your family and friends when they see gray dots appear and disappear!

YOU WILL NEED:
- A sheet of graph paper
- A black marker



1. Starting in the upper left corner of your graph paper, use your marker to color a square that is four spaces wide and four spaces tall.
2. Skip one column of spaces to the right of the square and color in another square the same size. Repeat this until you have a row of five squares.
3. Next, skip one row below the first line of coloring and add another five squares the same size as the first line.
4. Repeat step 3 until have at least five rows of black squares.
5. Take a look at your illusion—gray dots will appear in the corner spaces between the squares!

Glossary

condition a health disorder

depth the apparent distance away something is

drift to move slowly or float

focused concentrated on something

hue a color or a shade of color

interpret to understand something in a certain way

nerves tiny body parts that carry messages to and from the brain

optical related to sight or seeing

pixels small parts that make up a bigger image

prey animals that are hunted and eaten by other animals

spheres ball-shaped objects

sways moves slowly from side to side

This optical toy from the 1800s used spinning discs to create an illusion of motion.